Message

From: Berkoff, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F347C01A92D7424FA840C24F6B7FBF6B-MBERKOFF]
Sent: 7/11/2013 2:58:12 PM
To: Krause, Patricia [krause.patricia@epa.gov]
Subject: site conditions blurbs

Patty,
Thanks for putting together the meeting this morning. Here are some sections of the working draft of the proposed plan that describe site conditions.
Michael

It's kind of lengthy... sorry about that

SITE CHARACTERISTICS

Allied Landfill occupies 89 acres including Portage Creek between Cork and Alcott streets within the City of Kalamazoo. In 2008, the Michigan Department of Environmental Quality (MDEQ) summarized the remedial investigations in the 2008 Allied Paper, Inc. Operable Unit Remedial Investigation Report. Upon finalization of the RI report, the EPA assumed the responsibility of lead agency for the remainder of work to be done at Allied Landfill. Significant findings from the Remedial Investigation are discussed below:

GEOLOGY/HYDROGEOLOGY

Allied Landfill is situated on the floor of a north-south trending valley drained by Portage Creek. The creek flows northward, emptying into the Kalamazoo River about 2.25 miles north of the site. As shown below, the valley is flanked by hills formed of unconsolidated material that rise about 80 feet above creek level to the east and 100 feet above creek level to the west. The graphic/map shown below and Figure 12 depicts the general topography of the Allied OU and its environs. Total relief across the site is about 70 feet, with elevations ranging from about 783 feet AMSL at the downstream end of Portage Creek (near the Alcott Street Dam) to about 853 feet AMSL at the highest point of the Monarch HRDL. The land surface of the Allied OU generally slopes toward Portage Creek.

Topography Graphic

Surface runoff at Allied Landfill is generally directed to Portage Creek. Runoff from the area capped during the IRM (i.e., the Bryant HRDL and FRDLs) is currently managed through a series of engineered drainage ditches and swales, routed to a settling basin (at the location of FRDL #2), and discharged to Portage Creek through an engineered outlet.

Geology

The geologic layers in the vicinity of the site generally consist of bedrock overlain by overburden. The bedrock underlying the region near the Allied OU consists of the Coldwater Shale formation. This formation is primarily fossiliferous shale (which contains limestone in some areas) and was deposited as mud in an offshore marine environment during early Mississippian time, about 350 million years ago. The surface of the formation, which near the site is estimated at an elevation of 650 to 700 feet above mean sea level (AMSL), slopes downward to the southwest. The formation is greater than 500 feet thick, with bedding dipping toward the northeast. Based on the elevation range provided above, the depth to bedrock beneath the site is estimated to be between 100 and 150 feet.

Seven geologic units were identified at the site based on site borings. The units include fill, residuals, peat, sand and gravel, silt, clay and till. Permeability is moderate to rapid, runoff is slow to rapid, and available water capacity is low to moderate.

Figure 1-2 and 3-4 identify the locations of representative geologic cross sections of the site. Figures 1-3 is a cross section running north-south from the City well field through the site, Figure 3-4 runs east west through the site. <cross-sections>

Hydrogeology

EPA has determined that impacted groundwater at Allied Landfill does not pose a risk outside of the waste. The City of Kalamazoo has raised concerns that contamination from Allied Landfill could migrate to the City well field. In 2009, MHLLC completed a Supplemental Groundwater Study to evaluate whether this pathway exists.

The study included an evaluation of existing data from Allied Landfill, the nearby Strebor facility, and the City wellhead protection model, and the collection of a new round of groundwater elevations at both properties. This additional round of groundwater elevations included a comprehensive network of wells from Allied Landfill and the Strebor, Panelyte, and Performance Paper properties sampled concurrently for the first time. The assessment of existing data supported previous determinations that a groundwater migration pathway from Allied Landfill to the City's Central Well Field is unlikely. This conclusion is based on the presence of a lateral aquitard beneath portions of Allied Landfill and an upward vertical hydraulic gradient between the regional aquifer (used by the City for potable purposes) and the shallow aquifer.

The groundwater elevation data supported the conceptual understanding of the following:

- Water is not dropping down to the elevation of the city wells as there is an upward gradient from the lower regional aquifer upward toward the surficial aquifer.
- Shallow groundwater flow in the area is to the east and not northwest toward the City's Central Well Field. Shallow groundwater from adjacent properties flows to the east and west onto Allied Landfill.
- Portage Creek is the point of discharge for shallow groundwater from Allied Landfill further directing groundwater away from the City Central Well Field.
- All available data suggest that a flow path from Allied Landfill toward the City's Central Well Field is unlikely.

Further empirical support for the conceptual understanding was provided by the analytical results for water samples collected by the City from its own production wells. There have been no detections of PCBs in the City's samples, even at trace levels.

The results of the supplemental groundwater investigation report provide a reasonable basis to determine that it does not appear there is a groundwater migration pathway from Allied Landfill to the City's Central Well Field. The complete report is included as Appendix A to the FS.

MDEQ generally concurred with the study's conclusions in an April 16, 2010 letter to EPA. In it, MDEQ stated the following:

- Portage Creek appears to be the primary influence on the configuration of the water table surface within Allied Landfill. In the main disposal area of Allied Landfill, shallow groundwater discharges radially to Portage Creek.
- Shallow groundwater is influenced, although not completely captured, by the creek.
- Due to the upward pressure exerted by the groundwater present in the regional aquifer, the downward flow of groundwater from the surficial aquifer monitored at Allied Landfill to the deeper regional aquifer is highly improbable.

Various data (collected over time) illustrate hydraulic disconnection between the surficial aquifer unit and the regional aquifer unit.

NATURE & EXTENT OF CONTAMINATION

Early investigative efforts recognized that if the full extent of PCBs were identified and appropriately remediated, then other associated substances at Allied Landfill would be appropriately addressed. The RI therefore focused on PCBs for identifying the extent of contamination. In addition to PCBs, several inorganics, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) were detected in soils, sediments, and groundwater. The RI report concluded the following:

- Target analyte list (TAL) inorganic constituents in soils and sediments that exceed criteria appear to be associated with the PCBs identified at Allied Landfill.
- Soils with inorganic impacts may be acting as a source resulting in low-level impacts to the groundwater.

- Target compound list (TCL) VOCs in soils, sediments and groundwater do not appear to be associated with contaminant impact identified at Allied Landfill. Detected TCL SVOCs in soils and sediments appear to have a similar distribution to the contaminant impact based on the data set available.
- The groundwater impact of detected SVOCs appears to be much less extensive than the SVOCs in soil at Allied Landfill. There were no SVOC exceedances of the screening criteria in the most recent sampling event.
- Concentrations of TCL pesticides did not exceed screening criteria.
- TCL pesticides were not present in the groundwater at the time of sampling, which is consistent with the soil and sediment data. One pesticide was detected in a leachate sample below screening criteria, but no exceedances were identified.
- Soils with visual indicators of residual impact can be expected to have PCB concentrations.
- During the most recent sampling, PCBs were detected in several of the groundwater seep monitoring wells located along Portage Creek near the Former Operational Areas, with PCB detections above the groundwater surface water interface (GSI) screening criteria in two locations.

Contaminants of Concern

PCBs are the primary contaminant of concern and therefore are being used as the primary indicator to define the extent of contamination at Allied Landfill. PCBs are associated with the residuals having entered the waste stream during the recycling of carbonless paper and appear to be the most widespread contaminant at Allied Landfill. As previously stated, most other COCs (inorganics and SVOCs) appear to be collocated with PCBs in the various media. PCBs at Allied Landfill are widespread. They are present in the residuals and soils and sediments as a result of the residuals eroding and mixing into the soils and/or sediments near or at the ground surface, in certain subareas of Allied Landfill, including the Monarch HRDL and Western disposal area. Other impacted areas, include the Alcott Street Parking Area, portions of the Goodwill property, and the private residential properties. Figure 1-4 provides the aerial extent of PCB-containing surface soils and residuals. Figure 1-5 provides the aerial extent of PCB-containing subsurface soils and residuals.

PCBs are present on parcels owned by Consumers Power, the Golden Age Retirement Community, and certain single-family residential parcels, though the exact extent has not been confirmed. Soil borings from these adjacent properties had visual and/or analytical confirmation of PCBs.. Additional surface and subsurface soil investigations will be carried out during the remedial design to either confirm the absence of PCBs or delineate the extent of PCB-containing soils/residuals before finalizing the cleanup boundaries for the Site.

PCBs are present in concentrations exceeding RALs in the following areas: the soils and sediments in the Former Operations Area, Former Bryant Mill Pond, certain Residential Areas east of the former Allied Paper property, and certain neighboring Commercial Areas; in groundwater in the Western Disposal Area and Bryant HRDLs/FRDLs; and in seeps in the Former Type III Landfill Area adjacent to the Bryant HRDLs/FRDLs. PCBs were detected in groundwater at isolated locations (3 of 56 monitoring well locations) and seeps (2 of 20 seep locations), all of which were all collocated within or adjacent to borings residuals were observed. As PCBs are not detected in groundwater outside of the waste, EPA does not believe there is a plume of PCBs emanating from Allied Landfill.

The highest exposure that is reasonably expected to occur at a site but that is still within the range of possible exposures is referred to as the reasonable maximum exposure (RME). PCBs are found in concentrations up to 2,500 ppm, however . the RME for the site soils and sediments is 60 mg/kg. Based upon this exposure scenario and low mobility of PCBs at Allied Landfill, EPA considers PCBs to be a low-level threat waste.

Fate and Transport

The following PCB fate and transport mechanisms were evaluated at Allied Landfill:

- PCB transport from surface water runoff and soil erosion
- PCB transport in groundwater
- PCB transport in Portage Creek
- PCB transport in air

PCBs in Residuals

In general, PCBs are generally immobile. They are chemically and thermally stable, fairly inert, have low solubility in water, and have a high affinity for solids making them strongly adhere to residuals. Typically, the lower the water solubility of a chemical, the more likely it is to be adsorbed onto solids. Adsorption properties are generally characterized by an organic carbon partitioning coefficient denoted by Koc. The Koc values for PCBs are relatively high, which means that PCBs readily adsorb to organic material in media such as sediments and soils. The octanol water partitioning coefficient, Kow, is a measure of PCB's solubility in water. The coefficient is the ratio of the concentration of PCBs in octanol over the concentration of PCBs in water. PCBs tend to have high Kow indicating they are not very soluble in water. Taken together, the combination of low-water solubility and high Kow values indicates that PCBs have a strong affinity for soils and suspended solids, especially those high in total organic carbon.

In addition to organic content, other soil or sediment characteristics affect the mobility of PCBs. These include soil density, particle size distribution, moisture content, and permeability. Also, meteorological and physical conditions such as amount of precipitation and the presence of organic colloids (micron-sized particles) can also affect the mobility of PCBs in the environment. PCBs that are dissolved or sorbed to mobile particulates (for example, colloids) may also migrate with groundwater in sediments and soils.

PCBs at Allied Landfill do not readily migrate out of the paper residuals. The residuals present at Allied Landfill are composed primarily of fibrous wood material and clay. PCBs have a high affinity for the residuals due to the high organic content. When compacted, the residuals have a low hydraulic conductivity. The hydraulic conductivity of 10 residuals samples collected from Allied Landfill was approximately 1.3×10^{-7} centimeters per second. As water does not easily flow through the residuals, the opportunities for PCBs to migrate via groundwater are low.

Based on the combined effects of high affinity for PCBs to adhere to the residual and the low hydraulic conductivity, it is understood that PCBs do not migrate significantly from the residual material. This finding is supported by the lesser extent of PCB detections in groundwater samples than in soil or sediment.

Groundwater

PCBs do not appear to be migrating in groundwater beyond the waste ~~management~~ areas at the former Allied Paper property. PCBs were detected in only 3 of 56 monitoring well locations and 2 of 20 seep locations. The exceedances of groundwater criteria occurred in wells screened within or immediately adjacent to the residuals. This finding supports the assumption that PCB transport in groundwater is limited.

Surface Water Runoff and Soil Erosion

There are portions of Allied Landfill (primarily in the Former Operational Areas) where PCBs and other COCs are present in surface soils and residuals. The materials may be transported to the floodplain or sediments in Portage Creek by erosion through the air or surface water runoff.

Direct Discharge

The most significant historical source of PCBs to Portage Creek from Allied Landfill was the discharge of PCB-containing residuals at the Former Bryant Mill Pond. The excavation of PCB-containing sediments, residuals, and soils and subsequent replacement with clean fill in the Former Bryant Mill Pond has isolated the materials from direct contact with surface water, and removed the largest source of PCBs to Portage Creek at Allied Landfill. Under current conditions, the remaining potential sources of PCBs to Portage Creek from Allied Landfill are primarily associated with the erosion of contaminated soils and sediments.

SUMMARY OF SITE RISKS

Exposure to PCBs is the primary risk driver at Allied Landfill. MDEQ completed a *Site-wide Final (Revised) Human Health Risk Assessment* and *Final (Revised) Baseline Ecological Risk Assessment* for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The Human Health Risk Assessment (HHRA) quantitatively identified potential carcinogenic and non-carcinogenic risks to human health through exposure to media impacted with PCBs, including:

- consumption of fish by recreational and subsistence anglers
- direct contact with PCB contaminated materials by residents, recreational users and construction/utility workers
- inhalation of dust and volatile emissions from PCB contaminated materials

The Baseline Ecological Risk Assessment (BERA) quantitatively identified potential risks to various ecological receptors for different exposure pathways. The mink (aquatic) and robin (terrestrial) are used to represent ecological receptors. [JC1] [JC2] [JC3]

EPA has determined that risk to human and ecological receptors exists at the Site based on the results of the HHRA and BERA. Prior to the start of the FS, EPA summarized the potential risks posed by PCBs at Allied Landfill in the 2009 "Summarization of Preliminary Remedial Goals Kalamazoo River/Portage Creek OU1." The memo incorporated information from the HHRA, BERA and Michigan Part 201 screening criteria to establish Preliminary Remediation Goals (PRGs) for Allied Landfill. Where available, for contaminants other than PCBs, updated Act 451, Part 201, screening criteria and drinking water maximum contaminant levels were used in the FS. EPA developed and evaluated alternatives in the FS to mitigate the risks.

As previously discussed, EPA has concluded that identification and appropriate remediation of PCBs will mean that associated chemicals of concern would also be addressed. Therefore the risk assessments focused on PCBs as the risk driver. Other potential contaminants of concern have been identified at Allied Landfill and will need to be considered with PCBs for the remedial action. Contamination has also been identified off-site at residential and commercial properties.

Current land use at the Allied Landfill property is industrial, although some adjacent residential properties contain residuals. The future land use at the former Allied Paper property is expected to be commercial and recreational and will continue to be neighbored by residential properties. [MB4]